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ABSTRACT

The Supplemental Instruction (SI) program of the University of Missouri-Kansas City addresses attrition by providing academic support in courses that are high risk for students. The program contains a number of innovative features, for example: high risk courses are identified instead of high risk students, and everyone in those courses is offered assistance; student participation in small group sessions is voluntary; and evaluation goes beyond student and faculty satisfaction surveys and includes actual rates of institutional change. Small group sessions incorporate such features as informal quizzes, group discussion, test question prediction, review of previous examinations, restructuring of classroom lecture notes, and other activities. The key people in the program are the SI leaders, who are presented as students of the subject of the course. As such, they present an appropriate model of thinking, organization, and mastery of the discipline. SI leaders attend all class sessions, take notes, read all assigned material, and conduct small group sessions. The SI program has been certified as an Exemplary Educational Program by the United States Department of Education, and has received National Diffusion Network funding. This paper describes program development, specific goals and objectives, results and outcomes for students and/or the institution, and potential for adaption by other institutions. (JDD)

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SUPPLEMENTAL INSTRUCTION

Improving Student Performance, Increasing Student Persistence

By

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Spring 1990

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Description of Supplemental Instruction (SI)

The Problem

A recent study reveals that the freshman to sophomore dropout rate is 42.7% for post-secondary institutions with open admissions policies.[1] ***Supplemental Instruction (SI)*** addresses attrition by providing academic support in courses that are high risk for students. *SI* is often attached to entry level courses.

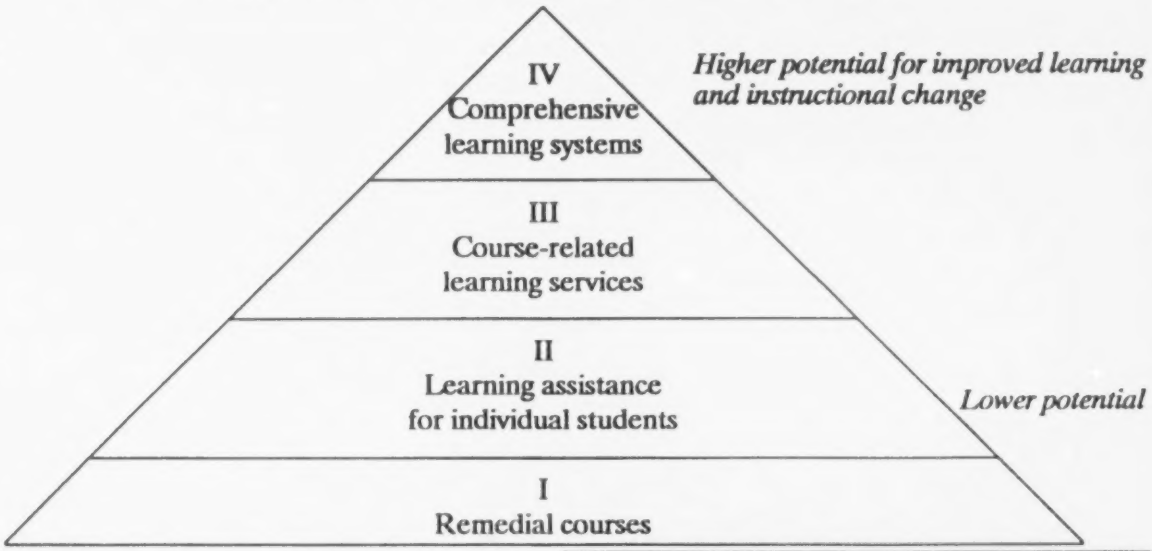
Various reasons contribute to the academic difficulty facing the entering students: large lecture sections with limited opportunity for discussion; abstract and unfamiliar course content; class assignments are general, without specific daily expectations; and exams are given infrequently, thereby denying students a periodic means of assessing their ability to comprehend and apply the material presented.

Supplemental Instruction, An Innovative Soluation

To our knowledge, the features of *SI* which were innovative to assistance programs when *SI* was initiated in the mid-1970's are as follows: ***high risk courses*** are identified instead of ***high risk students*** and everyone in those courses is offered assistance; student participation in small group *SI* sessions is voluntary; and evaluation of *SI* goes beyond student and faculty satisfaction surveys and includes actual rates of institutional change. *SI* looks at attrition from the institutional (macro) rather than the individual (micro) level.

A model that ranks the basic learning strategies is called the ***Hierarchy of Learning Improvement Programs***. It ranks the four basic program types in terms of effectiveness. They are differentiated by how effective they are in meeting the needs of students and how well the programs are institutionalized into the academic mainstream.

The Hierarchy of Learning Improvement Programs



The most common and least effective activities were remedial classes (Level I). Of moderate success were Level II activities that provide tutorial assistance to individual students. Level III activities provide adjunct learning experiences for review, reinforcement, and reteaching of selected topics that are integrated into the ongoing requirement for the course. Level IV activities require course instructors to make significant changes in their delivery of course materials.[2]

Supplemental Instruction most closely fits into the category of Level III. Keimig said of Level III activities, "Students' learning needs are presented as necessary because of the nature of the objectives and content of the course rather than because of students' deficiencies. Therefore, all students have access to supplementary, possibly innovative, instructional experiences, which benefit nonremedial students as well.... The feature that distinguished Level III from Level II learning centers is the link of services to specific academic courses in Level III."

According to many experts, the first six weeks of the freshmen semester is the most critical time for students with respect to retention. The problem with many traditional intervention strategies is that they react to students who demonstrate academic difficulties. One of the most common methods of identifying a ***high risk student*** is a low score on the first exam. By the time that the student is identified, it may be too late. *SI's* proactive approach, on the other hand, provides assistance from the first day of class.

Research from UMKC, as well as other institutions, suggest that preadmission analysis of ACT/SAT scores, class rank, and other criteria do not constitute a very accurate means of identifying high risk students. Typically more students are identified than can be accommodated in a learning assistance program. Yet, it is not difficult to identify ***high risk courses*** through analysis of records from the Registrar's office. High risk courses, as defined in the *SI* model, are those courses in which 30% or more of the students make course grades of D, F or withdraw. These courses can form a significant hurdle to any student, despite their academic preparation.

The impact of student involvement with *SI* carries over into succeeding semesters. Students report that they use *SI* study strategies in other classes. Some establish informal groups using *SI* study techniques in classes where *SI* is not offered.

SI is one of several collaborative learning strategies used today. It is estimated that 450 institutions use collaborative methods.[3] UMKC has trained learning assistance personnel and faculty from 300 colleges and universities in use of *SI*.

In March 1990, Harvard University released a study entitled, ***The Harvard Assessment Seminars: Explorations With Students and Faculty About Teaching, Learning and Student Life***. A summary of this study said, "Some relatively simple changes in teaching methods can produce significant gains in learning for college students....The researchers reported that college students do their best in courses that include "frequent checkpoints" such as quizzes, tests and oral exams. They also thrive...when they do at least some of their studying in small groups rather than logging long solitary hours of study in a library."[4]

From inception, *SI* review sessions have incorporated many of the features acclaimed in the new Harvard study: informal quizzes, group discussion, test question prediction, review of previous examinations, restructuring of classroom lecture notes, and other activities that help students process the material.

Overview of Supplemental Instruction

There are several key elements of *SI* that differentiate it from group tutoring and other forms of academic support: the *SI* program is attached to specific courses which are historically difficult for students; participation in the *SI* program is voluntary; the *SI* leader attends all targeted class sessions; the *SI* leader is trained in specific teaching/learning theory and techniques before the beginning of the term; the *SI* program is supervised by a trained professional staff member; the program is offered only in classes in which the faculty member invites and supports *SI*; *SI* sessions are conducted regularly and integrate course content with learning strategies; the *SI* leader facilitates and encourages the group to process the material rather than acting as an authority figure who lectures to participants; and the program is evaluated rigorously.

Assistance begins the first week of the term. During the first class session the *SI* leader describes *SI* and surveys the class in order to establish a schedule for *SI* that will be convenient for the majority of students who indicate interest. From these surveys the *SI* leader schedules three 50-minute *SI* sessions per week. *SI* sessions occur in classrooms near the course classroom instead of in a learning center and are open to all students in the course on a voluntary basis. *SI* leaders are students who have previously completed this or a comparable course.

All students enrolled in the targeted course are encouraged to participate; therefore, *SI* groups are composed of students of varying abilities and no effort is made to segregate students on the basis of academic ability. Since *SI* is introduced on the first day of class and is open to all students in the class, *SI* is not viewed as remedial. UMKC research demonstrates that the rate of participation in *SI* is the same for students in both the highest and lowest ACT composite score quartiles and that both higher and lower ability students benefit within the same group.

SI targets classes that have a 30% or higher rate of D or F grades and withdrawals. Often these classes are large lecture sections. On some campuses they may be general education requirements or ***gatekeeper classes***, critical introductory courses that must be passed to enter a program of study.

It is important to note that students typically perceive their need as content-centered. Experience shows, however, that their most common need is for the prerequisite learning skills that are basic to content mastery. The *SI* leader recognizes the difference between students' perceived needs and the students' real needs and supports the former while leading students to perceive the latter.

The key people in the program are the *SI* leaders. They are presented as ***students of the subject.*** As such, they present an appropriate model of thinking, organization, and mastery of the discipline. *SI* leaders are deemed competent in the content area by the instructor of a targeted course.

All *SI* leaders take part in an intensive two day training session before the beginning of the academic term. This training covers such topics as how students learn, theories of student development, instructional strategies aimed at strengthening student academic performance, and data collection and management details. The *SI* leaders also meet as a group with the *SI* supervisor at least three times during the term for follow-up and problem-solving sessions.

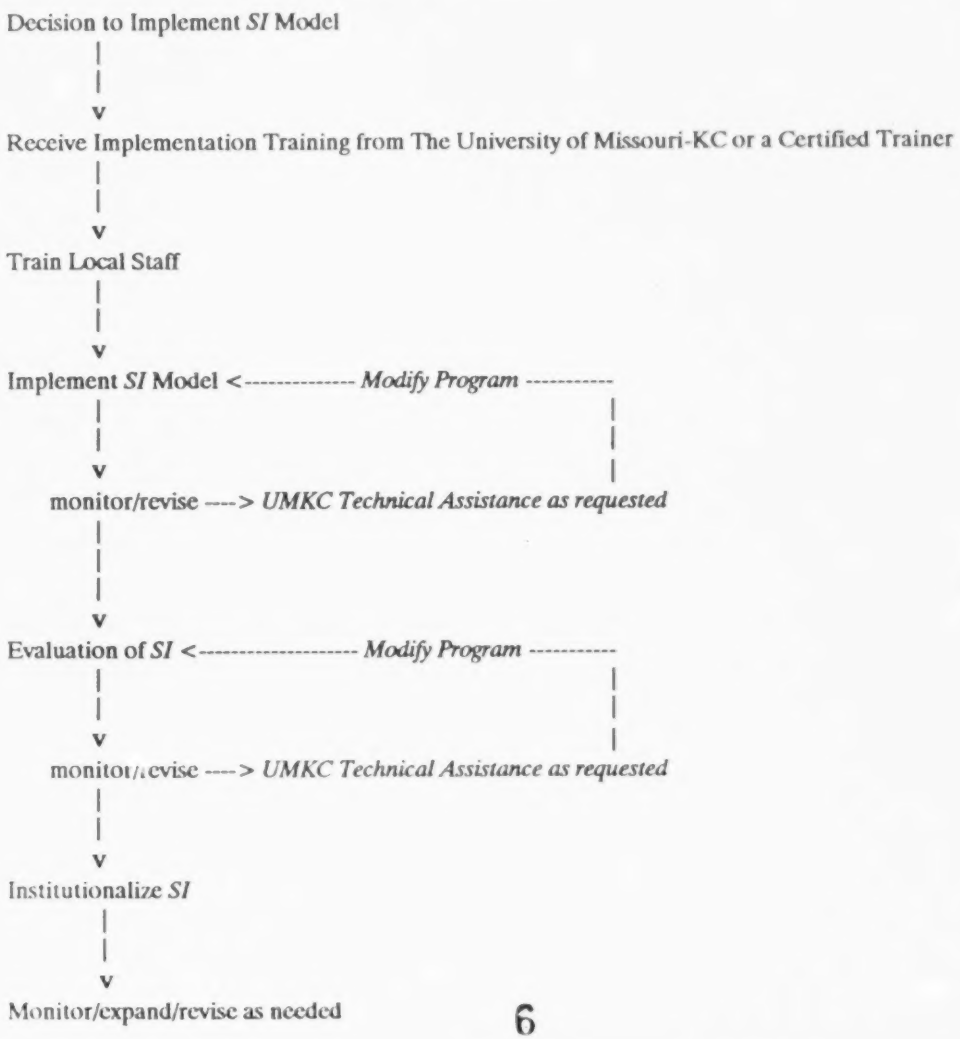
SI leaders attend all class sessions, take notes, read all assigned material, and conduct three 50-minute *SI* sessions each week. The *SI* sessions integrate ***how to learn*** with ***what to learn***. Students who attend *SI* sessions discover appropriate application of study strategies, e.g., note taking, graphic organization, questioning techniques, vocabulary acquisition, and test preparation, as they review content material. Students have the opportunity to become actively involved with the course material as the *SI* leaders use the text, supplementary readings, and lecture notes as the vehicle for learning how to study.

The *SI* supervisor, an on-site professional staff person, implements and supervises the *SI* program. This person is responsible for identifying the targeted courses, gaining faculty support, selecting and training *SI* leaders, monitoring the quality of the *SI* session and evaluating the program.

The *SI* program is evaluated through the analysis of semester course grades and reenrollment data for three groups: students who participated in *SI*; students who initially suggested intent to participate, but who were unable due to scheduling conflicts; and those students who never participated, and never suggested intent to participate in *SI*. Student satisfaction surveys are also collected on a periodic basis and are used both formatively and summatively.

The following diagram provides the typical protocol for implementing *SI*. The National Diffusion Network of the U.S. Department of Education supports institutions that wish to implement *SI*. Institutions that sign an implementation agreement and receive training during the three day workshop can receive extensive technical assistance from UMKC. Besides the UMKC staff, field trainers who have been certified by UMKC are available to help institutions implement the *SI* model.

SI Program Protocol


Decision to Implement SI Model
Receive Implementation Training from The University of Missouri-KC or a Certified Trainer
Train Local Staff
Implement SI Model
Modify Program
monitor/revise ----> UMKC Technical Assistance as requested
Evaluation of SI
Modify Program
monitor/revise ----> UMKC Technical Assistance as requested
Institutionalize SI
Monitor/expand/revise as needed

Development of Supplemental Instruction

Supplemental Instruction was initiated in 1974 by Dr. Deanna C. Martin at the University of Missouri-Kansas City. Over the next five years the *SI* model was refined and expanded. UMKC is an urban public university of nearly 12,000 students. Nearly half the students are enrolled in graduate or professional schools. The *SI* program is administered through the Center for Academic Development that Dr. Martin directs.

SI was first used in courses in the Schools of Medicine and Dentistry. Financial support for the 1974 pilot program was provided by the *Kansas City Association of Trusts and Foundations* (KCATF). The *SI* program then received a grant from the *Health Careers Occupation Program* (U.S. Department of Health, Education, and Welfare) to serve additional students in the Schools of Dentistry, Medicine and Pharmacy. Following an additional grant from the KCATF, the University supported its expansion throughout the institution's College of Arts and Sciences.

Problems overcome during the expansion of *SI* at UMKC were not atypical of problems which currently arise on other campuses. Faculty and administration want to be assured that *SI* does not represent *hand holding*, contribute to grade inflation, waste scarce financial resources, or infringe on academic freedom. The two most important factors in *SI's* continued viability is that the program does not consume faculty time and that the *SI* program is rigorously evaluated, both formatively and summatively. Acceptance of *SI* among professional schools makes the program more attractive to lower division units.

In 1981 the *SI* program won certification as an ***Exemplary Educational Program*** through the U.S. Department of Education. The *SI* program was then eligible to request national dissemination funds from the *National Diffusion Network* (NDN). Since 1984, the NDN has awarded UMKC approximately $70,000 each year to help other colleges implement the *SI* model.

UMKC provides all funding for the local campus program. Since *SI* is offered in nearly twenty courses each year, 40% of the 2,000 freshman and sophomore students in the College of Arts and Sciences have an opportunity to participate. *SI* programs on other campuses range from modest pilot programs of one or two courses to more ambitious programs of 60 (University of Louisville, Kentucky) and 120 (Weber State University, Utah).

The UMKC *SI* program is administered by a team of four staff members, each of whom shares *SI* duties. One person serves as the lead *SI* supervisor and is assisted by the other three. The total is 1.8 FTE for the team. Ten students are hired each semester to serve as *SI* leaders.

Research suggests the cost to implement and maintain the *SI* program at UMKC is offset by the increased number of students who persist. Most of the cost for the program is in existing learning center personnel. The per-student cost of the program presupposes existing university staff who can be assigned permanently or on a release time basis to the *SI* program. For example, the director of a tutoring program could spend part of his/her time supervising the *SI* program. At many campuses, the *SI* program is started with funds which are redirected from the existing tutor budget. Careful analysis of student contact hours reveals the cost effectiveness of *SI* in comparison to tutoring programs.

The yearly budget at UMKC to provide *SI* to twenty courses is $15,000. This provides a salary of $650 for each course to the *SI* leader. An additional $100 is budgeted for each course to provide for photocopying, materials, books, and other incidental expenses. UMKC makes other contributions through use of classrooms, office space, office equipment, and secretarial support.

Specific Goals and Objectives of Supplemental Instruction

1. Significantly reduce attrition rates in "high risk" courses.

In courses which have a 30 percent or higher rate of D and F grades and withdrawals, *SI* should reduce these rates by approximately 50%. At UMKC these include courses from lower division College of Arts and Sciences and various professional schools.

2. Improve academic performance of participating students.

Holding admissions test scores and high school rank as equivalent, *SI* participating students should demonstrate statistically significant higher differences in course grades when compared to non-participating students.

3. Increase reenrollment/persistence by participating students.

Holding admissions test scores and high school rank as equivalent, *SI* participating students should demonstrate statistically significant higher rates of reenrollment in subsequent semesters and graduation from college when compared to non-participating students.

4. Increase students' skills in comprehension, analysis, critical thinking, and problem-solving.

SI participating students should operate more often at the abstract level rather than the concrete level of reasoning.

5. Provide a cost effective model of collaborative learning that can be replicated in a variety of learning environments.

Results and Outcomes for Students and/or The Institution

The effectiveness of the *SI* program was validated by the U.S. Department of Education (*Joint Dissemination and Review Panel*) in December 1981 and was recertified by the Department (*Program Effectiveness Panel*, the successor to the *JDRP*) in September 1985 as an ***Exemplary Educational Program***. Each semester careful records are maintained on the UMKC student performance with the *SI* program. Consistently, the following outcomes occur:

1. Reduced Attrition Rates.

Rates of unsuccessful enrollments (percentage of D and F grades) in targeted courses are significantly lower than they were before the addition of *SI*. In addition, the rates of course withdrawals for *SI* participants are about half the rate for non-participating students.

2. Improved Academic Performance.

Evaluation data show that the average course grade of the *SI* group is between one-half and a full letter grade higher than the average course grades of students not participating in *SI*. These performance differences are still evident when the *SI* group is compared to a motivational control

group - those students who wanted to attend but were unable to participate due to scheduling conflicts. (Conflicts were identified as other classes or work.)

Differences in performance patterns between *SI* and non-*SI* students are also apparent despite the students' predicted academic ability. Compared within their peer groups, *SI* is as effective for students scoring in the bottom quartile on ACT/SAT tests as it is for students scoring in the top quartile. Minority students also demonstrate equal success with other students who participated in *SI*.

3. Increased Reenrollment/Persistence Towards Graduation.

Students who participated in *SI* reenrolled at the University at a rate ten percentage points higher than non-participating students. This difference held true whether the students had scored in either the top or bottom quartile of college entrance tests.

The freshmen who participated in *SI* during Fall 1983 had graduated by Fall 1989 at a rate 12.4 percentage points higher than non-*SI* participating students (30.6% versus 18.2%). The difference was statistically significant at the 0.008 level.

4. Increased Critical Thinking Skills.

Reuven Feuerstein, clinical psychologist and the developer of *Instrumental Enrichment*, a cognitive improvement program, said that two goals of enrichment programs are to develop the ability to become an autonomous learner and to transform poor learners from passive recipients and reproducers of information into active generators of new information.

A recent article in The Reading Teacher focused on another of the benefits of collaborative learning, an increase in critical thinking skills.[5] Preliminary research suggests that students who participate in *SI* at least six times during the semester show positive changes in thinking behavior.

5. Cost Effective Model That Can Be Replicated.

The *SI* program has been implemented at 300 other colleges and universities.

Potential for Adaption by Other Institutions

Since 1984, over three hundred American colleges and universities have been trained in use of the *Supplemental Instruction* model. Funding has been provided by the U.S. Department of Education's *National Diffusion Network* to provide a central staff at UMKC to coordinate the dissemination of the model. In addition, eleven people who have successful *SI* programs at other institutions have received training and serve as Certified Trainers for assisting other institutions in implementing *SI*.

SI has also been implemented in several other educational environments. *SI* is in the third year of a pilot program at a racially-diverse inner city high school in Kansas City, Missouri. Several test preparation programs for the medical profession (Medical College Admissions Test, National Board Examinations, etc.) are using *SI* to enhance their programs.

Three day training workshops are held throughout the year at various locations in the U.S. to enable representatives from other institutions to implement *SI*. Publications, videotapes, and training manuals are available for use. Technical assistance is available from UMKC and its Certified Trainers.

To estimate the cost of implementing *SI* at an institution, three factors need to be considered. First, will the institution need to employ new personnel to implement the program, or can it use existing personnel? Second, will the *SI* supervisor need assistance from other personnel? Third, what types of support will be forthcoming from the adopting institution in terms of release time and use of facilities?

The time commitment required of the *SI* supervisor will vary over the course of the semester. During the first month of the academic term, the supervisor attends all lectures in the targeted course and all *SI* sessions. After this first intensive period, the supervisor's time commitment diminishes. The following figures represent the cost of a typical pilot implementation.

The time commitment required of the *SI* leader includes attending all class sessions (generally three hours weekly), facilitating the *SI* review sessions (three to four hours weekly), preparation time for the *SI* review sessions, and attendance at training and supervisory meetings of the *SI* supervisor.

Pilot Program Budget for One *SI*

SI Supervisor Release Time (0.15 FTE)*	*Release Time*
SI Leader (For One Course)	$650/semester/course
Incidental Expenses	$100
	==========
Typical cost of a pilot program	$750 + *Release Time*

* Averaged over a 16 week semester

Footnotes

1. National Center for the Advancement of Educational Practices, American College Testing Program. 1989. ACT Institutional Data File, 1989.

2. Keimig, R.T. 1983. Raising Academic Standards: A Guide to Learning Improvement. ASHE-ERIC Higher Education Report No. 4. Washington, D.C.: Association for the Study of Higher Education. ED 233 669. 100 pp. MF-01; PC-04.

3. *For Many Teachers, Classroom Lecture Is Giving Way to Projects That Students Tackle in Small Groups*. August 2, 1989. Chronicle of Higher Education. pp. A9, A12.

4. *Harvard Report Pushes Quizzes, Study Groups.* March 5, 1990. The Kansas City Star. pp. A1, A10.

5. Smith, Carl B. *Shared learning promotes critical reading.* October 1989. The Reading Teacher. pp. 76-77.

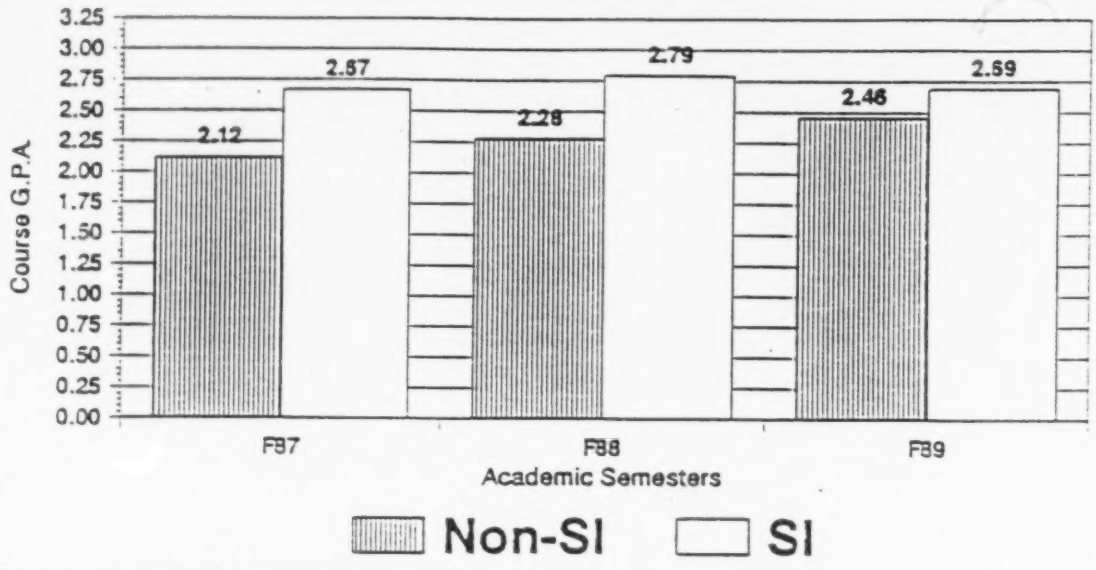
About the Authors

Dr. Deanna C. Martin directs the Center for Academic Development at the University of Missouri-Kansas City. Besides being the founding director of the Center, she created the Supplemental Instruction model in 1974. Dr. Martin earned her doctorate in reading education at UMKC. At UMKC she is also an Associate Professor in the School of Education. She is also active in community affairs with the Greater Kansas City Mental Health Foundation.

David Arendale is an Assistant Director of the Center for Academic Development at the University of Missouri-Kansas City. Mr. Arendale holds a Masters Degree in History from Emporia State University in Emporia, Kansas and is currently pursing a doctorate in Higher Education Administration at UMKC. After nearly a decade of working in Kansas community colleges as both a faculty member and administrator, he recently joined UMKC. He is active in civic affairs and with his local church.

UMKC SI DATA

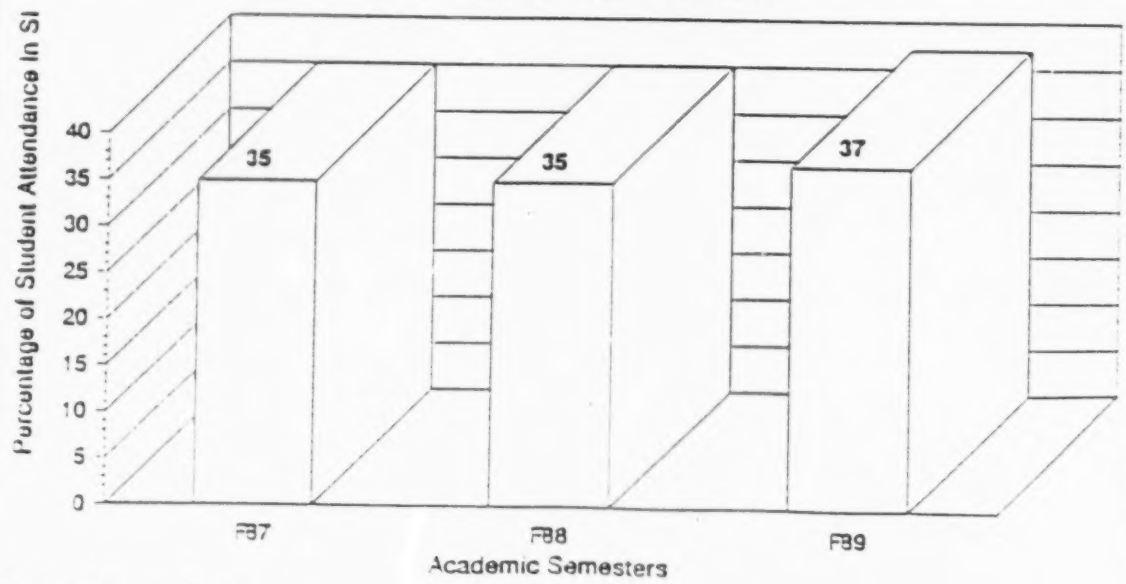
Grade Point Average of Final Grades
Fall 1987, Fall 1988, and Fall 1989



University of Missouri - Kansas City

UMKC SI DATA

Percentage of Student Attendance in SI
Fall 1987, Fall 1988, and Fall 1989



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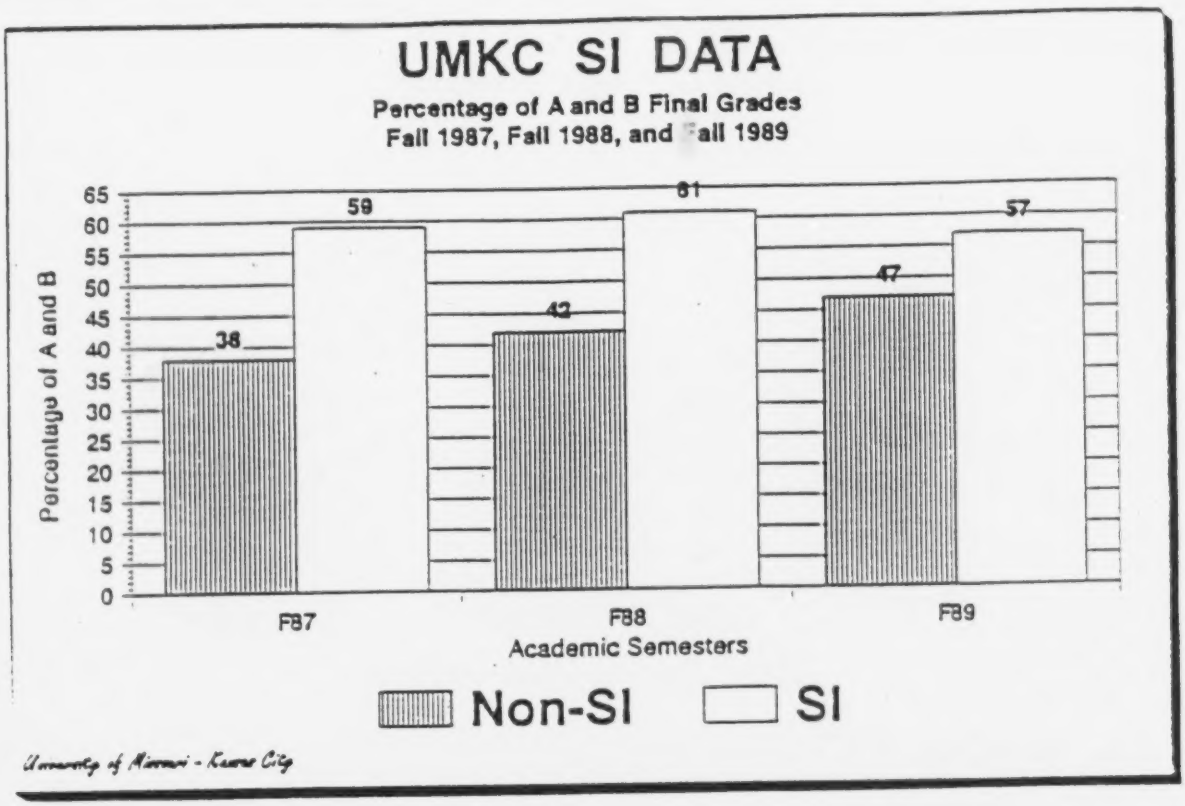
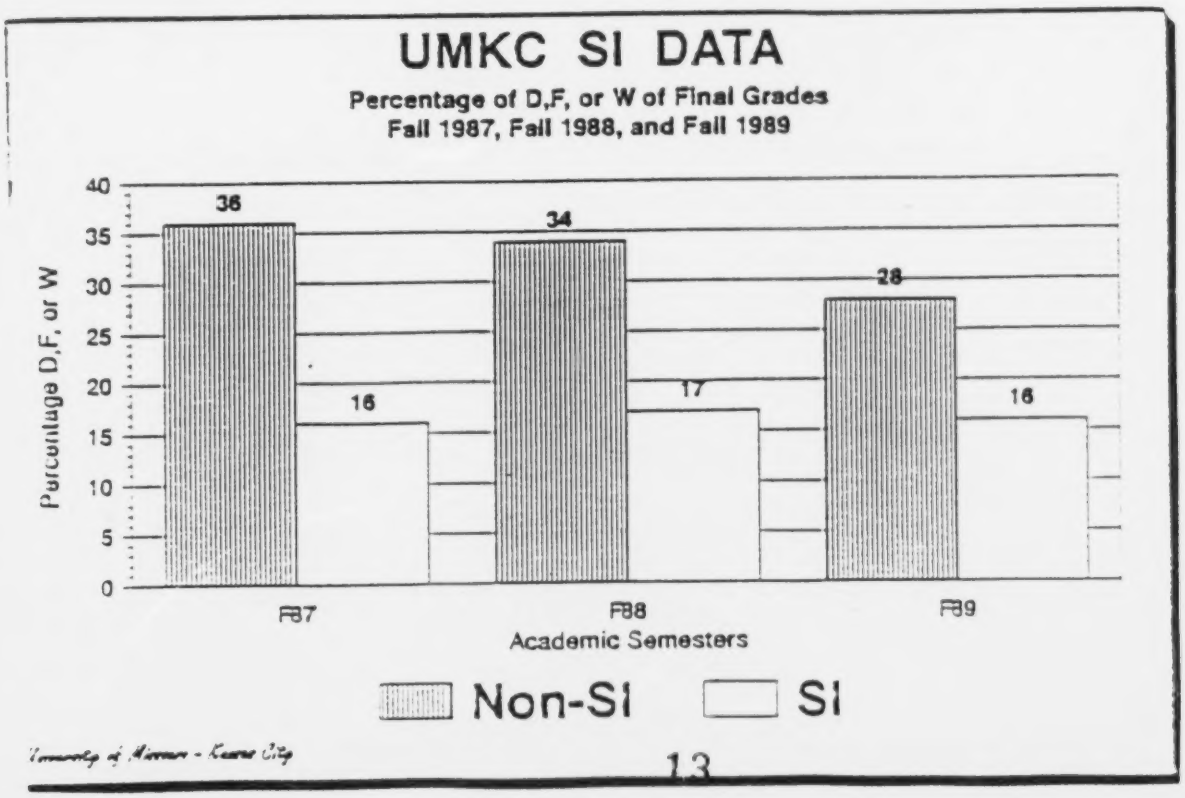
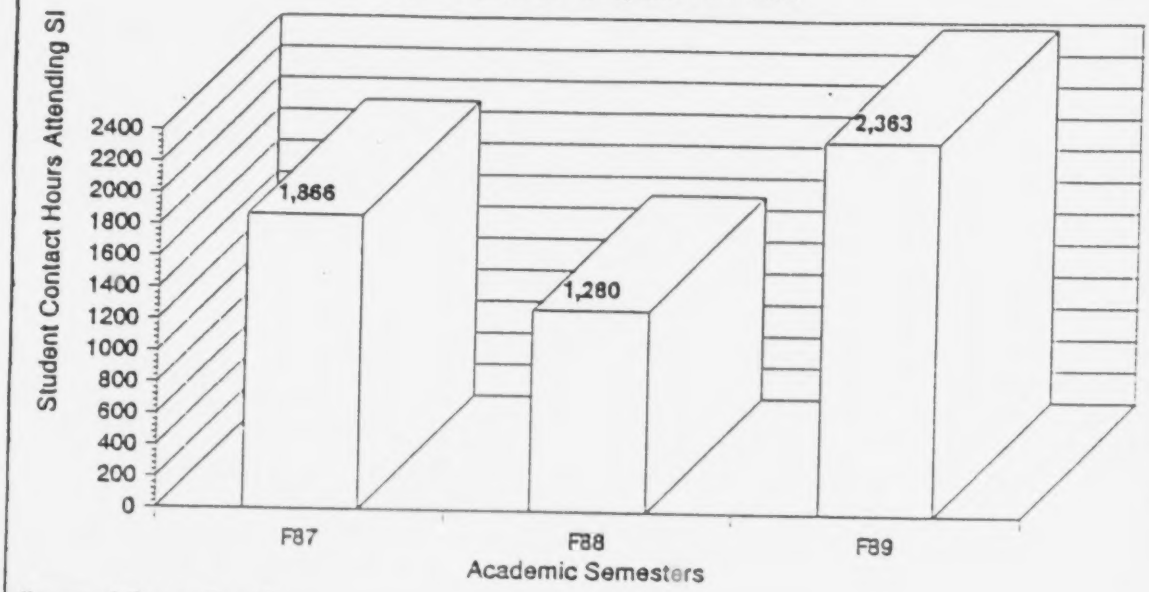

UMKC SI DATA
Percentage of A and B Final Grades
Fall 1987, Fall 1988, and Fall 1989
Percentage of A and B
65
60
55
50
45
40
35
30
25
20
15
10
5
0
38
59
42
61
47
57
F87
F88
F89
Academic Semesters
Non-SI
SI
University of Missouri - Kansas City


UMKC SI DATA
Percentage of D,F, or W of Final Grades
Fall 1987, Fall 1988, and Fall 1989
Percentage D,F, or W
40
35
30
25
20
15
10
5
0
36
16
34
17
28
16
F87
F88
F89
Academic Semesters
Non-SI
SI
University of Missouri - Kansas City

UMKC SI DATA

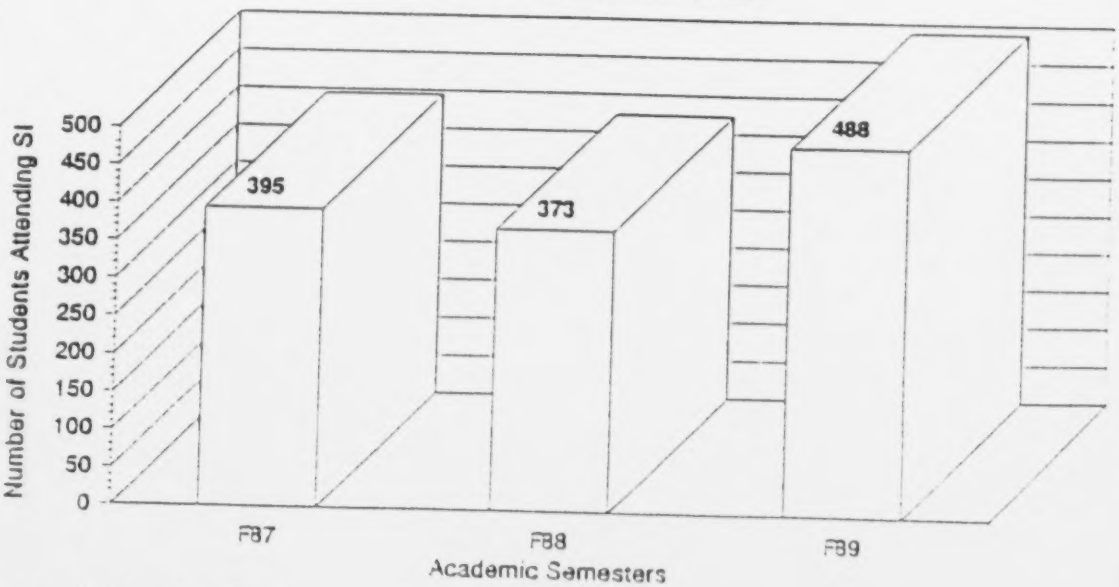
Student Contact Hours Attending SI
Fall 1987, Fall 1988, and Fall 1989



University of Missouri - Kansas City

UMKC SI DATA

Number of Students Attending SI
Fall 1987, Fall 1988, and Fall 1989



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